



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/726,162	12/02/2003	David H. Leach	107044-0042	4165
24267 7590 03/06/2007 CESARI AND MCKENNA, LLP 88 BLACK FALCON AVENUE BOSTON, MA 02210			EXAMINER RUTHKOSKY, MARK	
			ART UNIT 1745	PAPER NUMBER
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		03/06/2007	PAPER	

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/726,162

Applicant(s)

LEACH ET AL.

Examiner

Mark Ruthkosky

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 23 January 2007.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-17 is/are pending in the application.  
4a) Of the above claim(s) 3-5 is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☐ Claim(s) 1,2,6-8,12-14,16 and 17 is/are rejected.  
7) ☐ Claim(s) 9-11 and 15 is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 1/23/2007; 5/10/2004.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application  
6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Information Disclosure Statement***

The information disclosure statements filed 5/10/2004 and 1/23/2007 have been placed in the application file, and the information referred to therein has been considered as to the merits. The US patent applications 10/413,986 and US 10/607,696 have been reviewed, but cannot be considered as they do not constitute prior art. The applications are not published documents. The reference to Cabuz was not submitted into the application file and cannot be considered. No international search reports or documents have been submitted into the application file and cannot be reviewed.

### ***Drawings***

The drawings filed on 5/10/2004 have been approved.

### ***Election/Restrictions***

Applicant's election without traverse of Group I in the reply filed on 12/18/2006 is acknowledged.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

Art Unit: 1745

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(c) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 6, 12, and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by

Sherman et al (WO 01/09520.)

The instant claims are to an electrostatically-actuated shutter and a fuel cell system including an electrostatically-actuated shutter, the shutter comprising:

(A) a first electrode held at a first voltage said first electrode having at least one opening therein;

(B) a second electrode held at a second voltage, that is different than said first voltage, and said second electrode having at least one opening therein;

(C) a diaphragm disposed between said first electrode and said second electrode, said diaphragm having openings therein that correspond with the openings in said second electrode, and which do not correspond with the openings in said first electrode;

(D) a driver coupled to said diaphragm that adjusts the voltage of said diaphragm such that when the driver sets a voltage for said diaphragm, the diaphragm is attracted to the fixed electrode having a different voltage, and when said diaphragm is drawn to said second electrode, its openings align with the openings of said second electrode to create apertures through which gases and vapors can flow; and

(E) an exit port through which gases and vapors are delivered from said shutter.

It is noted that the claims are to a product, a shutter. The intended use or functional language describing the product has been considered, but is not given patentable weight. For example, the limitation, "when the driver sets a voltage for said diaphragm, the diaphragm is attracted to the fixed electrode having a different voltage, and when said diaphragm is drawn to said second electrode, its openings align with the openings of said second electrode to create apertures through which gases and vapors can flow" describes an intended use of the product in a specific situation- when a specific voltage is applied to the electrode. This does not limit the claimed product itself.

Sherman et al (WO 01/09520) teaches an electrostatically-actuated shutter use in a metal-air or fuel cell system (see pages 5-6, page 8, under Detailed Description and page 15, first paragraph.) The shutter comprises a first electrode having at least one opening therein held at a first voltage and a second electrode having at least one opening therein held at a second voltage that is different than said first voltage (see page 12, first paragraph and figures 8-11.) A diaphragm is disposed between said first electrode and said second electrode. The diaphragm includes openings therein that correspond with the openings in said second electrode. The openings of the diaphragm do not correspond with the openings in said first electrode as the openings are found across the full passageway and include both the openings of the first electrode and the non-open areas of the first electrode. A driver is coupled to said diaphragm that adjusts the voltage of said diaphragm such that when the driver sets a voltage for said diaphragm, the diaphragm is attracted to the fixed electrode having a different voltage, and when said diaphragm is drawn to said second electrode, its openings align with the openings of said second electrode to create apertures through which gases and vapors can flow. An exit port is

Art Unit: 1745

noted in figure 11, through which gases and vapors are delivered from said shutter. As the shutter valve is “electrostatically driven” and includes a driving mechanism created from a fixed charge due to an electrostatic potential between two surfaces, it is considered to include predetermined voltages and moves according to the voltages applied to open or close the valve (page 8.) The diaphragm is a sacrificial oxide (dielectric) layer that is held close to the electrode at both ends, as it is bonded to the surfaces of the electrodes (page 12, first paragraph.) Thus, these claims are anticipated.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2, 7-8, 14 and 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Surampudi et al. (US 5,773,162), in view of Sherman et al (WO 01/09520), as applied to the claims above.

Surampudi et al. (US 5,773,162) teaches a direct methanol fuel cell system comprising a planar array of direct oxidation fuel cells and a means for delivering the fuel to the fuel cells (see column 3, column 17 and the claims.) Surampudi et al. (US 5,773,162) does not teach that the means for delivering the fuel is a plurality of electrostatically actuated shutter components. As noted, Sherman et al (WO 01/09520) teaches an electrostatically-actuated shutter used to deliver reactant gasses in fuel cell systems. It would have been obvious to one of ordinary skill in the art

Art Unit: 1745

at the time the invention was made to use the electrostatically-actuated shutter to deliver reactant gasses in fuel cell in order to control fluid flow using an electrostatic mechanism that can be powered by the electric device. By placing the electrostatically-actuated shutter taught in Sherman between the fuel source and the anode or between the oxidant source and the cathode allows for the control of the reactants to the electrodes.

With regard to claims 7-8, it would be obvious to one of ordinary skill in the art to add an additional diaphragm between the first and second electrode for the same reason the first diaphragm is included between the first and second electrodes. A second diaphragm will provide further separation between the electrodes and increased dielectric characteristics between the electrodes.

With regard to claim 14, it would be obvious to one of ordinary skill in the art to use a polyimide dielectric material as the diaphragm as the prior art teaches that the diaphragm layer is positioned between the first and second layers to bond the layers together. One of ordinary skill in the art would choose materials that will polyimide material would bond the layers together including polymer materials such as polyimides.

The artesian would have found the claimed invention to be obvious in light of the teachings of the references.

#### ***Allowable Subject Matter***

Claims 9, 10, 11 and 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the

Art Unit: 1745

base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter:

With regard to claim 9, the prior art does not teach an additional diaphragm is of a configuration such that it seals over the openings of the electrode to which it is drawn when said driver applies a predetermined voltage to close the shutter. The most pertinent prior art, Sherman, does not teach a second diaphragm, while the first diaphragm does not have the structure to seal the openings of the electrodes.

With regard to claim 10, the prior art does not teach a diaphragm and additional diaphragm that are each coupled to separate drivers that each apply a voltage to establish a predetermined voltage differential to draw its respective diaphragm to the desired electrode in order to open and close the shutter. The most pertinent prior art, Sherman, does not teach a second diaphragm. Further, neither diaphragm is coupled to separate drivers that each apply a voltage to establish a predetermined voltage differential to draw its respective diaphragm to the desired electrode in order to open and close the shutter. The diaphragms are not directly coupled to drivers.

With regard to claim 11, the prior art does not teach an electrostatically-actuated shutter wherein the first fixed electrode is generally flat, and the second electrode is of a dome shape, and the diaphragm is held to the closed position without an applied voltage such that the shutter is normally closed. The most pertinent prior art, Sherman, does not teach that the second electrode is of a dome shape, or the diaphragm is held to the closed position

With regard to claim 15, the prior art does not teach an electrostatically-actuated shutter wherein the diaphragm is substantially comprised of a dielectric material and further comprises a



Art Unit: 1745

conductive layer embedded within said dielectric material which is connected to an electrical driver circuit. The most pertinent prior art, Sherman, does not teach that the diaphragm is substantially comprised of a dielectric material and a conductive layer embedded within said dielectric material. Further, the prior art does not teach the diaphragm is connected to an electrical driver circuit.

For these reasons, the claims are noted to include allowable subject matter.

***Examiner Correspondence***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Ruthkosky whose telephone number is 571-272-1291. The examiner can normally be reached on FLEX schedule (generally, Monday-Thursday from 9:00-6:30.) If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free.)

Mark Ruthkosky  
Primary Patent Examiner

Art Unit: 1745

Art Unit 1745

*Mark Ruthkosky*  
3.2.2007

MARK RUTHKOSKY  
PRIMARY EXAMINER